



MND Physics

The Nature of Magnetism

Many substances have magnetic properties. Magnetic properties can also be induced by electricity as in the case of electromagnets. The forces between a magnet and magnetic objects or other magnets can be explained in terms of a magnetic field. Iron filings can help to visualize the magnetic field. In this experiment, you will explore the shape and strength of the magnetic field surrounding a permanent magnet using a white sheet of paper (covering the magnet) and iron filings sprinkled on top of the paper. You will also explore the nature of the magnetic field that exists between the poles of two magnets in close proximity. Additionally, you will examine temporary magnets (iron nails) and identify its magnetic behavior as it comes in contact with a permanent bar magnet.



EQUIPMENT:

2 Permanent bar magnets, a compass, an iron nail, white sheet of paper, a beaker of iron filings.

PROCEDURE:

CAUTION: Never allow the iron filings to come in contact with the magnets!

PART 1: Drawing the magnetic field around a magnet

1. Set up one bar magnet on the table top. Place a sheet of paper on top of the magnet so that the bar magnet is situated in the center portion of the sheet (the magnet is underneath the paper).
2. Sprinkle some iron filings on the paper. NOTE: the fewer filings you use, the better representation of the field results.
3. Tap very gently on the paper; the filings will take the shape of the magnetic field.
4. Sketch what you observe using DATA TABLE #1.

PART 2: Drawing the magnetic field between two magnets

5. Return the iron filings to the beaker.
6. Now take two magnets and place them as shown in DATA TABLE #2 part 1.
7. Cover the two magnets with a sheet of paper.
8. Sprinkle some iron filings on the paper (again, the fewer the better). Tap very gently on the paper; the filings will take the shape of the magnetic field between the 2 magnets.
9. Draw what you observe using DATA TABLE #2 part 1.
10. Repeat the experiment for the second magnet configuration, DATA TABLE #2, part 2.
11. Return the iron filings to the beaker.

PART 3: Mapping out the magnetic field with a compass

12. Place a single magnet on the table top (do not cover with a sheet of paper).
13. Determine which end of the compass pointer (white or red) points to north and which points to south. Record your findings.
14. Place the compass in each of the locations shown in DATA TABLE #3; sketch the direction the compass is pointing in each circle. Clearly indicate the field direction using a small arrow.
15. From the arrows drawn in the compass rings, what can you deduce concerning the magnetic field around the magnet?

PART 4: Polarity of an iron nail in a magnetic field

16. Place a nail and magnet on the desktop as shown in DATA TABLE #4, part 1. The nail should be in contact with the magnet.
17. Place a compass in the area designated by the circle. Record the needle direction.
18. Now reverse the nail direction and again, place a compass in the area designated by the circle. Record the needle direction.
19. Which end of the nail is north and which end is south? Explain your answer using the compass results.

PART 5: Magnetic poles in flat magnets

20. Observe the flat flexible MND Cougar magnet that is affixed to the white board in the front of the room. Carefully explain where the poles are located. You can use any piece of equipment provided in this lab to help you devise your answer.

PART 6: The magnetic field of the Earth

21. Draw a figure that represents the Earth. Draw and label the north and south geographic poles. Draw and label the north and south magnetic poles. The interior of the Earth can be thought of as a huge bar magnet. Draw a bar magnet in the interior of the Earth and label the poles of the bar magnet. Lastly, sketch several magnetic field lines indicating the proper direction.

DATA TABLE 1

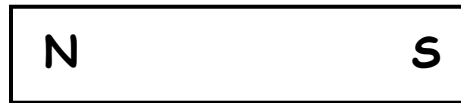
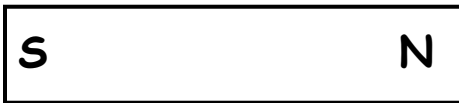
N	S
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DATA TABLE 2

Part 1:



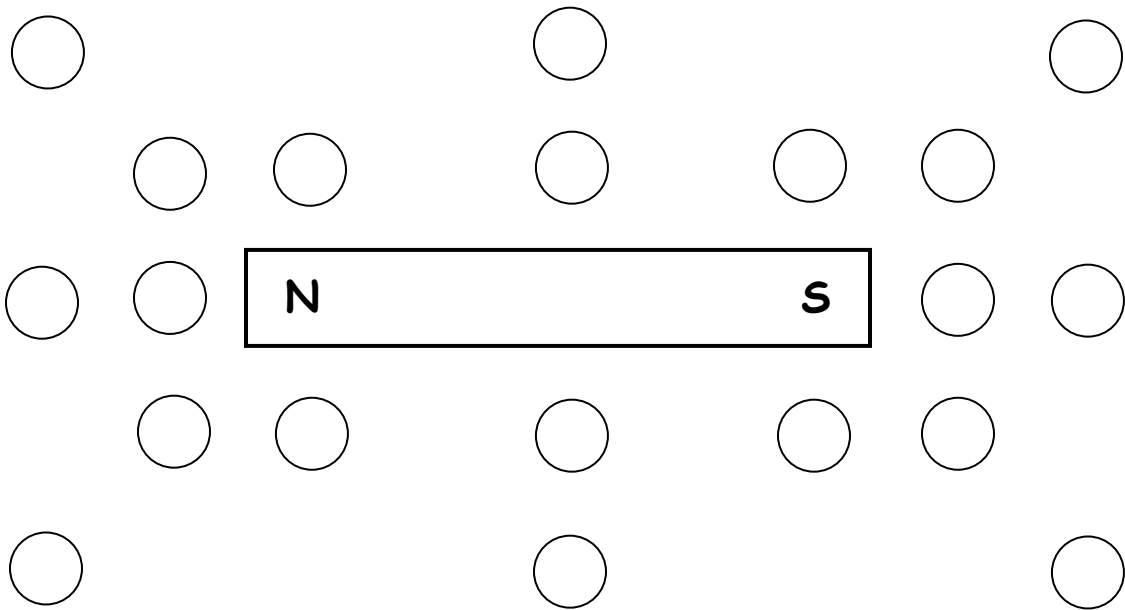
Part 2:



DATA TABLE 3

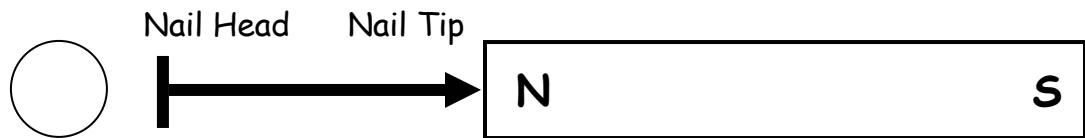
My compass pointer:

The north pole is _____ color, south pole is _____ color.
(Remember, the north compass pole will be attracted to the bar magnet's south pole and visa versa).



DATA TABLE 4

Part 1:



Part 2:

